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ABSTRACT

This report describes the use of "invention workshops" in the elementary science program to stimulate the creative potential of children and to involve the child in divergent thought proceses. The workshops begin with an interest-getting experience focusing attention on a project open to unlimited creative interpretation; the most effective devices have been cartoons. Suggestions are given for the "Inventor's Kits" using quite simple and ordinary things with which students transform ideas into tangible objects of the Rube Goldberg type. It is the writer's feeling that both teachers and pupils became sensitized to the existence, value, and sheer thrill of creative thought. (Author/EB)

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Recognizing, Accepting, and Nurturing Creativity in Children

by

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Here's good news for housewives! Tired of spending long hours making beds, cleaning floors, and picking up the children's toys? Your salvation is the ingenious new "Bed-Making-Pillow-Plumping-Toy-Picker-Upper," guaranteed to do your housework in half the time. The inventor (age 8) claims it can easily be installed in your bedroom, and - now don't miss this - also will wake the kids at a pre-set time. If you order now you will also receive, free of charge, the "Automatic Suit-Getter." This amazing device consists of a series of ropes, levers, and magnets and will deliver your clothes from closet to you. Since it uses no electricity, this is a bargain you can't afford to miss.

Another handy little gadget is designed especially for fathers troubled by persistent late-hour pleas by baby for a glass of water. Just drop a marble into a long tube attached to the "Marble-Activated Drink of Water." The marble releases a pin attached to string, a series of pulleys, and the mechanism from an old alarm clock. The clock spring unwinds and hoists a cup of water from a pre-filled reservoir. Baby is happy, and Daddy gets his sleep.

These inventions, and a great many other oddball contraptions, were dreamed up by children of grades 2 - 6 in Vancouver (British Columbia) public schools. "Invention Workshops" have been incorporated into the elementary science program in some of our schools,

and children's responses have been nothing less than sensational. The workshops are designed to stimulate and nurture whatever creative thinking talents children have. Teachers are encouraged to operate on the basis of two assumptions: (1) All children have some inborn creative potential, but the degree to which this ability develops is linked to environmental influences: and (2) stimulation, opportunity, materials, and encouragement are important creativity-inducing factors of the classroom environment.

Psychologists have identified a variety of divergent thinking abilities involved in creative thinking. Some of these are:

(1) Fluency of idea production - the ability to think of a large number of ideas related to a problem;

(2) Flexibility - the ability to produce ideas in a variety of categories;

(3) Originality - production of ideas that are novel and statistically uncommon; and

(4) Elaboration - embellishment of ideas with detail and refinement.

A classroom environment involving only convergent, analytical thought processes which emphasize only "right" answers and structured experimental procedures probably contributes little to the development of the above abilities. Alternatively, classroom conditions can be purposely adjusted to stimulate and focus

children's thinking in divergent patterns. Given the opportunity to "mess about" with ideas and materials, elementary school children can easily forget the anti-creative constraints that commonly stifle originality in adult thought. And, if encouraged to do so, many children can assemble ideas and everyday materials into astonishingly creative products.

Invention Workshops have been an attempt by teachers to involve children in divergent thought processes. The workshops begin with an interest-seducing experience focusing attention on a project open to unlimited creative interpretation. The most effective devices found so far for accomplishing this have been cartoons! (Heresy! Cartoons in science class?). Perhaps we should take a look at how this is done.

An Invention Workshop

Before the lesson, it was not uncommon to hear children's comments and inquiries about the mysterious packages labeled "Rube Goldberg Inventors' Kits" which lined the classroom shelves. Finally, at the beginning of what is supposed to be a science lesson, the teacher projects a slide onto a screen, showing an unthinkable conglomeration of unrelated objects (a lawn sprinkler, an aquarium, a hound sleeping on a table, etc.). "Can any of you invent an automatic garage-door opener using these items?" The pupils stare at the teacher in utter disbelief - he is really off his rocker this time! Impossible task? On the screen flashed a picture, one of the "Inventions

of Professor Lucifer Gorgonzola Butts" made famous by the master machinist of the comic strips, Rube Goldberg. Since the late R.G.'s famous "inventions" were popular during the 1920's and 1930's, these space-age children had never seen such contraptions. The children were obviously delighted. More inventions are projected. "That's super!" Next a film - "The Mouse-Activated Candle Lighter"* - shows an actual contraption operating in the true Goldbergian manner.

The teacher reached into one of the Rube Goldberg Inventors' Kits and pulled out a piece of cardboard. "How many different uses can you think of for this brown, square-shaped, lightweight, flexible-yet-strong, piece of material?" Involvement was obvious as the children engaged in the spirit of discussion, producing a wide spectrum of ideas. Incubation periods were short as hands would wave as an insight or new idea came. Creative production is an attitude of the mind - making the familiar seem strange. The secret of inventing lies in detecting new combinations for using quite simple and ordinary things. The "Inventors' Kits" (packages of junk) included such things as cardboard, straws, paper clips, elastic bands, pie plates, and string. The availability of a variety of materials provided a good starting point but all agreed that additional inexpensive materials could be used. With packages in hand, the students were off. To a casual observer, the groups of children working in all areas of the classroom would

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* Prism Productions, Incorporated, 531 Dawson Dr., Camarillo, Calif.

seem chaotic compared to orderly rows of children reading textbooks. For the next two weeks, the regular class time for science, and many student-requested after-school overtimes were spent by the neophyte inventors - sometimes frustrated but always fascinated because they were transforming ideas into tangible objects.

In one corner, a group of children busily unites a makeshift treadmill, a replica of the family dog, and a tantalizing bone to form the world's first "Automatic Dog-Walking Machine." For the harried executive who has everything, other children invent the perfect device - an ultramodern rocking chair equipped with a bellows and series of air tubes so the over-tired man can sooth both his nerves and temperature simultaneously. Cool air automatically flows across the executive's face as he enjoys his late afternoon martini (which, of course, is mixed in a special shaker attached to the chair!).

Some girls decide to make mother's life a little bit easier; a "Rapid Grape Seed Remover" combines pulleys, a windlass, and a grape-sized trough. To operate, a weight is dropped which unwinds string attached to a complicated series of wheels and cams with the result that each grape rolling down the trough is punctured by a pin, thus removing the seeds. If the accumulated grape seeds become bothersome, they can be fed to your pet canary.

The children's inventions combine art with logic and blend humor with simple everyday objects. They haven't been directed

to be "fluent," "flexible," or "original" in their thinking, but instances of these thought processes abound as the inventions are planned and constructed. Soon, the whole classroom takes on a comic atmosphere, and seems filled with active but pint-sized Rube Goldbergs.

By the way, if you don't recall Rube Goldberg yourself, you will find the name in Webster's Third International Dictionary defined as "...accomplishing by extremely complex roundabout means what actually or seemingly could be done simply." The man Rube Goldberg was also extremely complex and often "roundabout." His creative abilities were highly developed, encompassing the writing of stories, poetry, song lyrics, play scripts, and the art of sculpturing (which he began at the ripe age of 80!). The Rube Goldberg most often remembered by the general public is the Pulitzer Prize-winning cartoonist, and inventor of outrageously amusing comic strip contraptions. Another hilarious example:

A "Device for Nominating a Candidate for High Office" places a "fresh air fiend" next door to the candidate. When the windows are opened, the fresh air addict's pet owl catches cold and sneezes into a toy bugle. This summons a company of National Guardsmen who think war is declared, and in their haste, they upset a milk man, spilling milk which attracts hundreds of cats. The howling of the cats wakes up the neighborhood, whose own angry yells and howls the candidate mistakes for the voices of his constituents calling on him to save the country. The candidate

thereupon jumps out of bed, throws open his window, and launches into a speech of acceptance.

As a young man attending the University of California at Berkeley, Goldberg ran up against "The Barodik" - a series of pipes, coils, beakers, gears, wires, etc. designed to measure the weight of the earth. Casting a leery eye at the proud professor who invented "The Barodik," he tackled the problem. Six months later he was left with the answer, and, admittedly, a head full of unprintable thoughts about the professor who assigned such a task. With a few years behind him, Goldberg looked back and saw "The Barodik" as a perfect example of how man can use so much to do so little. This was the beginning of the age of the so-called time-saving inventions, and looking about he noticed that most of these machines managed to complicate life in other ways. So began the famous Rube Goldberg contraptions - an effort to make people laugh at themselves and not take the new inventions too seriously. At the same time, Goldberg seems to urge us to keep looking and wondering at the marvelously unpredictable passion of Man for creating things.

Fun and Games or Genuine Science?

The elementary science curriculum purist may feel the urge to raise certain questions regarding our Invention Workshops. What are the children learning? What specific concepts and skills are developed? Our answer: I maintain that children

learn as much as they might from a more usual science activity, but also a great deal more. Most assuredly, children develop many of the same ideas about pulleys, gears, levers, etc., ordinarily included in a unit on "Simple Machines". The key difference is that ordinarily dull information concerning elementary mechanisms really means something if you need to "figure out" how to build an invention you are really excited about. And, if you are concerned about engaging children in the process of science, the skills of observing, hypothesizing, measuring, predicting, and inferring are clearly involved. All of these are combined with an important "plus" - children are intimately involved as creative thinkers.

Granted, creativity, as such, cannot be taught; the process is far too elusive and uniquely individual for that. However, it can be fun "thinking up" lots of ideas, playing with the oddball notion, and working hard grasping for a novel intuitive flash. The main thing, I feel, is that both teachers and pupils become sensitized to the existence, value, and sheer thrill of creative thought. Isn't that truly the essence of Science?

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